al. (US 6,259,744). Applicants respectfully traverse the rejections.

Applicants note that the Final Rejection states that Applicants' remarks, in their Response dated January 26, 2006, were persuasive for traversing the pending rejections as they might apply to independent claims 25 and 26 and their dependent claims (see Final Rejection page 2, first paragraph). Applicants' remarks in the January 26, 2006, Response only addressed how the ADRA failed to suggest the features for which it was cited and mentioned Sugiyama and Lee only to state that these two references do not ameliorate the ADRA's deficiencies. The ADRA is cited in the present rejections of independent claims 25 and 26 and their dependent claims for suggesting the same subject matter for which its was previously cited. The newly applied references of Uesugi and Yoshida are not cited for supplementing the teachings of the ADRA with respect to the features Applicants previously identified as missing from the teachings of the ADRA. Since: (1) Applicants' remarks in the January 26, 2006, Response only addressed how the ADRA failed to suggest the features for which it was cited, (2) the ADRA is presently cited for suggesting the same features for which it was previously cited, (3) the newly applied references are not cited for supplementing the teachings of the ADRA with respect to the

features Applicants identified as missing from the ADRA, and (4) the Final Rejection acknowledges that Applicants' remarks were persuasive for traversing the rejections as they might apply to independent claims 25 and 26 and their dependent claims, it necessarily follows that basis for the currently pending rejections is unfounded. Therefore, allowance of independent claims 25 and 26 and all claims dependent therefrom is warranted.

For thoroughness, though, Applicants present the following discussion of how the claimed subject matter distinguishes over the combined teachings of the newly applied references.

The applied references fail to suggest the combined features recited in claim 25 of: (1) a plurality of demodulators that demodulate a received signal based on regions of demodulation patterns to which signal points belong, using demodulation patterns that differ for error detecting units of the received signal and (2) a plurality of detectors that perform error detection on the demodulated signal for each of the error detecting units to obtain reception data.

In an exemplary but non-limiting embodiment of the invention illustrated in Figs. 3 and 4A-4F, six different demodulation patterns are applied to a received signal to determine the regions of these patterns that overlap a received symbol. Accordingly, the receiver illustrated in Fig. 2 employs each of

six demodulators 113 to apply a different one of the six demodulation patterns illustrated by Figs. 4A-4F, respectively.

If the transmitted symbol is a 64-QAM symbol, then the six demodulators can determine which one of the 64 prospective symbols of the constellation (indicated by black dots in Figs. 3 and 4A-4F) the received symbol is intended to represent. This determination can be made by comparing the six patterns to the received symbol and eliminating, as candidates for the received symbol, all prospective symbols of the constellation within the regions of negative results (i.e., either shaded regions or slanted line regions).

For example, the constellation position of a received symbol may be visually determined with certainty by sequentially comparing the template patterns illustrated in Figs. 4A-4F with the received symbol and progressively eliminating, as candidates for the position of the received symbol, all prospective symbols of the constellation lying in regions of a particular type (i.e., either shaded or slanted line region) for the particular template.

More specifically, suppose the symbol representing the bit pattern 100000 (i.e., the upper right-most symbol position) in Fig. 3 is transmitted and then received by a communicating party. If the received symbol is compared to the six templates

illustrated by Figs. 4A-4F, then the position of the received symbol can be determined with certainty in the following way. Based on the comparison of the received symbol with the pattern of Fig. 4A, all candidate positions for the received symbol within the shaded region (i.e., left side of the vertical axis) are eliminated. Based on the comparisons of the received symbol with the patterns of Figs. 4B-4F, all candidate positions for the received symbol within the slanted-line regions of each pattern are eliminated. According to this process, all candidate positions for the received symbol other than the upper right-most position are eliminated. Therefore, the upper right-most position represents the received symbol.

Now suppose the bit pattern 1000 is transmitted using 16-QAM modulation. The same demodulators and demodulation patterns discussed above for receiving a 64-QAM modulated signal may similarly be used to identify, with certainty, the particular 16-QAM symbol that was transmitted. By eliminating all prospective 64-QAM symbol candidates in the shaded region of Fig. 6A and all such candidates in the slanted line regions of Figs. 6B-6D, the receiver may determine that the position of the received symbol lies in the upper right one-fourth of the upper-right quadrant. Because the receiver does not realize that the transmitted symbol is actually a 16-QAM symbol, it can only resolve what it believes

to be four of the six bits comprising a 64-QAM symbol. Thus, the receiver believes it has received four bits correctly and two bits in error. In actuality though, all four bits comprising the transmitted 16-QAM symbol have been correctly received by the receiver.

Continuing this example, if the transmitter transmits a symbol representing the bit sequence 10 using QPSK, then the receiver will determine that it has received two bits of a 64-QAM symbol correctly and four bits in error (see Figs. 7 and 8A-8F). However, the receiver will actually have received both bits of the QPSK symbol correctly.

The ADRA illustrated in Fig. 1 is incapable of achieving the feature described above, using demodulators 14-1 and 14-2. The ADRA discloses that <u>demodulator 14-2 demodulates a portion of a received multiplexed signal</u> to obtain information identifying the particular type of variable modulation used to modulate payload data (ADRA page 3, lines 20-23). Thereafter, demodulator 14-2 conveys the identified form of variable modulation to demodulator 14-1 so that <u>demodulator 14-1 may demodulate another portion of the received multiplexed signal</u> using the identified form of modulation (page 3, line 23, through page 4, line 1). Thus, the ADRA does not disclose a demodulator that demodulates error detecting units in <u>a transmission unit</u> using different

demodulation patterns, as proposed in the Final Rejection (see Final Rejection page 3, lines 5 and 6, and page 4, lines 18 and 19).

As a result, the ADRA does not suggest the claimed feature of a plurality of demodulators that demodulate a received signal based on regions of demodulation patterns to which signal points belong, using demodulation patterns that differ for error detecting units of the received signal. <u>More specifically, the ADRA demodulators 14-1 and 14-2 do not operate on the same symbol and, therefore, cannot both operate on error detecting units of this symbol</u>. Instead, demodulators 14-1 and 14-2 operate on different signals that are multiplexed together by multiplexer 7. Since the ADRA does not suggest multiple demodulators that all operate on error detecting units of a symbol, it necessarily follows that the ADRA cannot teach using demodulation patterns that differ for the error detecting units of the received symbol.

Uesugi similarly discloses applying different types of demodulators to different symbols (see Uesugi ¶¶ 0030-0035). More specifically, Uesugi discloses that a QPSK demodulator demodulates a received QPSK symbol and a BPSK demodulator demodulates a received BPSK symbol. The QPSK and BPSK demodulators do not demodulate the same received symbol.

Although Yoshida may disclose demodulating a received symbol using a plurality of different demodulating schemes, Yoshida does not disclose the claimed feature of performing error detection on each prospective demodulation bit of a highest potential M-ary modulation pattern. In the exemplary application of the invention discussed above in which the highest M-ary form of potential modulation is 64-QAM, the demodulated symbol is always assumed to have six bits, regardless of the actual modulation type applied to the symbol and the number of bits actually associated with this symbol, and error detection is performed on the six generated demodulation bits. By contrast to this feature, Yoshida discloses predicting the type of modulation applied to a symbol and outputting a number of demodulated bits in accordance with the predicted modulation type. Thus, if the predicted modulation type is 64-QAM, then six demodulated bits are output for each received symbol. On the other hand, if the predicted modulation type is BPSK, then one demodulated bit is output for each symbol.

The Final Rejection proposes that the ADRA's error detecting section 16 would detect errors in the demodulated bits (see Final Rejection page 3, lines 9 and 10, and page 4, line 22, through page 5, line 1). However, the ADRA does not suggest performing error detection on a presumed six bits of a demodulated symbol

when demodulation section 14-2 identifies the symbol modulation type as BPSK or QPSK. Instead, the ADRA's error detecting section 16 performs error detection on two bits of a demodulated symbol if the modulation type is identified by demodulation section 14-2 as QPSK and on one bit if the identified modulation type is BPSK. The same result would occur if Uesugi's demodulation system were integrated into the ADRA system.

The claimed device performs error detection on a number of demodulation bits, representing a received symbol, determined by the highest potential M-ary form of modulation. Thus, in the exemplary embodiment of the claimed invention discussed above in which the highest M-ary type of modulation is 64-QAM, error detection is performed on six demodulated bits representing a received symbol even if the received symbol was modulated using QPSK or BPSK. The applied references do not suggest this feature.

In accordance with the above discussion, Applicants submit that the applied references do not suggest the subject matter defined by claim 25. More specifically, the applied references do not suggest the combined features recited in claim 25 of: (1) a plurality of demodulators that demodulate a received signal based on regions of demodulation patterns to which signal points belong, using demodulation patterns that differ for error

detecting units of the received signal and (2) a plurality of detectors that perform error detection on the demodulated signal for each of the error detecting units to obtain reception data. Claim 26 similarly recites these features. Therefore, allowance of claims 25 and 26 and all claims dependent therefrom is warranted.

In view of the above, it is submitted that this application is in condition for allowance and a notice to that effect is respectfully solicited.

If any issues remain which may best be resolved through a telephone communication, the Examiner is requested to telephone the undersigned at the local Washington, D.C. telephone number listed below.

Respectfully submitted,

James E. Ledbetter
Registration No. 28,732

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JEL/DWW/att

Attorney Docket No. L9289.02118
STEVENS DAVIS, MILLER & MOSHER, L.L.P.
1615 L Street, N.W., Suite 850
P.O. Box 34387
Washington, D.C. 20043-4387
Telephone: (202) 785-0100
Facsimile: (202) 408-5200